

# The prevalence of malocclusions in patients seeking orthodontic treatment at COMS from Chitwan District of Nepal

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## ABSTRACT

**Background:** Malocclusion is the abnormal relation between maxillary and mandibular teeth which leads to various problems like esthetics, phonation, mastication, psychological and social problems. The prevalence of malocclusion is highly variable and its range is very wide and heterogeneous.

**Aims and Objectives:** To assess the prevalence of various malocclusion traits and to evaluate the orthodontic treatment need based on the Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN) among the patients visiting the College of Medical Sciences (COMS), Bharatpur, Chitwan.

**Materials and Method:** A total of 530 patients visiting dental OPD, College of Medical Sciences, Bharatpur, Chitwan were included in this study among which 288 were male and 242 were female patients. Out of the total 530 subjects, malocclusion was observed in 359 individuals. Therefore, all subsequent results and findings reported in the study are based on these 359 subjects exclusively. Intraoral examination was carried out to assess malocclusion based on Angle's classification, overjet, overbite, open bite, crowding, spacing, and crossbite. The statistical test employed in the study was the Chi-Square test, which was utilized to assess the presence of a significant difference.

**Result:** The present study showed that Class I (55.2%), malocclusion was most prevalent followed by Class II (40.9%) and then Class III (3.9%). Increased overjet (41.2%), deep overbite (40.7%), anterior crowding (70.8%), midline spacing (17.5%), and anterior crossbite (16.4%) were more prevalent occlusal traits. DHC (Dental Health Component) of IOTN (Index of Orthodontic Treatment Needs) showed more in grades 1 and 2 (61.88%) followed by grades 4 and 5 (26.03%).

**Conclusion:** Class I crowding was the most prevalent malocclusion in adolescents in Bharatpur, Chitwan. The majority of patients fall in grade 1 and 2 categories followed by grades 4 and 5 of DHC of IOTN grading.

**KEYWORDS:** Dental Health Component, Index of Orthodontic Treatment Need, Malocclusion, Prevalence

## INTRODUCTION

The oral-facial region is usually an area of significant concern for the individual because it draws the most attention from other people in interpersonal interactions and is the primary source of vocal, physical, and emotional communication.<sup>1</sup> Malocclusion is a developmental condition, not a disease, which is included under the heading of Handicapping Dentofacial

Anomaly by the World Health Organization and is defined as "An anomaly which causes disfigurement or which impedes function, and requires treatment if the disfigurement or functional defect was likely to be an obstacle to the patient's physical or emotional well-being".<sup>2</sup> Currently malocclusion is third in the ranking of priorities among the problems of dental public health worldwide, surpassed only by dental caries and

periodontal diseases.<sup>3</sup> Its prevalence is highly variable and is estimated to be between 39% and 93% in children and adolescents worldwide.<sup>4,5</sup> The major etiology of malocclusion is attributed to genetic, racial, and environmental factors. Persistence of malocclusion can lead to several problems like esthetics, mastication, phonation, psychological, and social problems with lack of confidence and negative impact on quality of life, temporomandibular joint problems, caries, and periodontal problems.<sup>6</sup>

The significance of any disease in a particular area can be gauged by its prevalence. This becomes even more important for developing countries like Nepal where oral health programs and preventive measures are far from satisfying needs. Epidemiological studies related to malocclusion help in orthodontic treatment planning and recognizing the environmental and hereditary elements in the etiology of malocclusion. Various methods are used to assess orthodontic treatment needs; while the Index of Orthodontic Treatment Needs (IOTN) is most commonly used to assess occlusal traits.

The prevalence of malocclusion is highly variable and its range is very wide and heterogeneous. The prevalence of malocclusion and the treatment needs have been established in a few regions of Nepal. To date, only a single study has been conducted to assess the prevalence of malocclusion in the Bharatpur Chitwan region. Therefore, the objective of this study was to assess the prevalence of various malocclusion traits and to evaluate the orthodontic treatment need to be based on the Dental Health Component (DHC) of IOTN among the patients visiting the College of Medical Sciences (COMS), Bharatpur, Chitwan.

## MATERIALS AND METHODS

This was a hospital-based cross-sectional study carried out in the Department of Orthodontics, College of Medical Sciences, Bharatpur, Chitwan, Nepal over a period of 6 months. The total sample size was calculated to be 316 using the formula  $Z^2pq/e^2$  where, Z was considered to be 1.96, p for prevalence rate which was 71.5<sup>7</sup>, q is 1-p and e is a permissible error which was included as 5%. Initially, the sample size for the study was estimated to be 316 individuals. However, due to the availability of a larger number of participants, the study was ultimately conducted among 530 subjects. It is worth noting that a larger sample size enhances the robustness of the

study. Convenient sampling methods were used for sample collection. The present study was conducted on the age group of 12 to 18 years (The age group is selected as the common age group to seek orthodontic treatment and most of the treatment is also carried out in the same age group) among which 288 males and 242 females were included. Patients with a history of previous or ongoing fixed orthodontic treatment or extraction, congenital facial defects, syndromes, and systemic diseases were excluded from the study. Ethical clearance was obtained from the Institutional Review Committee. Consent was obtained from adult patients and from the parents of the adolescent group.

The examination was done by a single examiner on a dental chair under illumination in the Department of Orthodontics. A mouth mirror and probe were used for intraoral examination. The subjects were assessed for malocclusion based on Angle's classification, overjet, overbite, open bite, crowding, spacing, and crossbite were recorded in a proforma. DHC of the IOTN was recorded for various malocclusion traits. This was classified into three categories of treatment need: Grades 1 and 2 (no or little need of treatment), Grade 3 (borderline need), and Grades 4 and 5 (definite or extreme need). As the variables analyzed in this study consist of categorical data rather than continuous data, a normality test was not performed. The statistical test utilized to assess the presence of a significant difference was the Chi-Square Test.

## RESULTS

Out of 530 patients screened; 288 (54.3%) were male and 242 (45.7%) were female. The mean age was  $15 \pm 3$  years.

The distribution of occlusal traits with normal occlusion was 171. Out of the total 530 subjects, malocclusion was observed in 359 individuals. Therefore, all subsequent results and findings reported in the study are based on these 359 subjects exclusively." Angle's Class I malocclusion 198 (55.2%), Class II 147 (40.9%) and Class III 14 (3.9%) (Table 1). Increased overjet was seen in 148 (41.2%) among which 66(44.6%) were male and 82(55.4%) were female, reduced overjet in 101 (28.1%) with male 53(52.5%) and female 48 (47.5%), 110 (30.6%) exhibited normal overjet. 87 (45.5%) male and 104 (54.5%) female present with normal overbite. Excessive overbite in 146 (40.7%) with female prevalent 80 (54.8%) in compared to male 66 (45.2%), 191 (53.3%)

exhibited normal overbite. The open bite was prevalent in 4.7% of the patients. Anterior Crowding was more common than posterior crowding and was present in 70.8% and 9.7% of patients respectively. Midline diastema was present in 17.5% of patients. Anterior crossbite was less common than posterior crossbite; which was 16.4% and 26.2% respectively. The statistical test employed in this study to assess the presence of a significant difference is the Chi-Square Test, with

a predetermined level of significance set at 0.05. A statistically significant difference was observed in any of the occlusal traits studied among male and female subjects. Excessive overbite and anterior crowding have been found to be significantly higher in females of this region. On DHC of IOTN evaluation 328 (61.9%) falls in Grade 1 and 2 (No or little need of treatment), 64 (12.1%) in grade 3 (Borderline) and 138 (26.0%) in grade 4 and 5 (Definite treatment need) (Table 2).

**Table 1: Distribution of Different Occlusal Traits**

Occlusal Trait		Total	Male	Female	P value
Angle's Classification	Normal occlusion	171 (32.3%)	92 (53.8%)	79 (46.2%)	0.01
	Class I malocclusion	198 (55.2%)	109 (55.1%)	89 (44.9%)	
	Class II malocclusion	147 (40.9%)	83 (56.5%)	64 (43.5%)	
	Class III malocclusion	14 (3.9%)	4 (28.6%)	10 (71.4%)	
Overjet	Normal (1-2mm)	110 (30.6%)	45 (40.9%)	65 (59.1%)	0.01
	Excessive(>2mm)	148 (41.2%)	66 (44.6%)	82 (55.4%)	
	Reduced(<1mm)	101 (28.1%)	53 (52.5%)	48 (47.5%)	
Overbite	Normal (25 to 40%)	191 (53.2%)	87 (45.5%)	104 (54.5%)	0.001
	Excessive (>40%)	146 (40.7%)	66 (45.2%)	80 (54.8%)	
	Reduced (<25%)	22 (6.1%)	11 (50.0%)	11 (50.0%)	
Open bite	Present	17 (4.7%)	9 (52.9%)	8 (47.1%)	0.35
	Absent	342 (95.3%)	155 (45.3%)	187 (54.7%)	
Anterior crowding	Present	254 (70.8%)	114 (44.9%)	140 (55.1%)	0.001
	Absent	105 (29.2%)	50 (47.6%)	55 (52.4%)	
Posterior crowding	Present	35 (9.7%)	9 (25.7%)	26 (74.3%)	0.01
	Absent	324 (90.3%)	155 (47.8%)	169 (52.2%)	
Anterior spacing	Present	63 (17.5%)	29 (46.0%)	34 (54.0%)	0.017
	Absent	296 (82.5%)	135 (45.6%)	161 (54.4%)	
Anterior cross bite	Present	59 (16.4%)	31 (52.5%)	28 (47.5%)	0.001
	Absent	300 (83.6%)	133 (44.3%)	167 (55.7%)	
Posterior crossbite	Present	94 (26.2%)	41 (43.6%)	53 (56.4%)	0.001
	Absent	265 (73.8%)	123 (46.4%)	142 (53.6%)	

Note:

1. Out of the total 530 subjects, malocclusion was observed in 359 individuals. Therefore, all subsequent results and findings reported in the study are based on these 359 subjects exclusively.
2. The statistical test employed in this study to assess the presence of a significant difference is the Chi-Square Test, with a predetermined level of significance set at 0.05.

Table 2: Dental Health Component (DHC) grades of Index of Orthodontic Treatment Need (IOTN)

DHC grade	Need for treatment	Total	Male	Female
Grade 1 and 2	No or little need of treatment	328 (61.9%)	181 (34.1%)	147 (27.7%)
Grade 3	Borderline	64 (12.1%)	35 (6.6%)	29 (5.5%)
Grade 4 and 5	Definite treatment need	138 (26.0%)	72 (13.6%)	66 (12.5%)
Total		530	288 (54.3%)	242 (45.7%)

## DISCUSSION

It is the first study of Bharatpur, Chitwan district of Nepal to evaluate the prevalence of occlusal traits and correlate them with the Dental Health Component of the Index of Orthodontic Treatment Need. The present report on malocclusion status and occlusal characteristics are comparable to other studies carried out on the Nepalese population in different regions of Nepal. It was found that the distribution of Angle's Class I, Class II, and Class III was 55.2%, 40.9%, and 3.9% respectively.<sup>8</sup> This study is in unison with Shrestha BK et al<sup>9</sup> study that reported malocclusion status of high school students in Kathmandu; Class I malocclusion was found in 59%, Class II in 25%, and Class III in 16% cases. This report is comparable to the previous study of the western region of Nepal by Baral<sup>10</sup>; which showed Angle's Class I at 71%, Class II at 24.6%, and Class III at 3.9%, and by Parajuli U et al<sup>11</sup> which reported Angle's Class I was 67.9%, Class II was 19.5% and Class III was 6.8%. Sharma JN<sup>12</sup> reported the prevalence of Class I, II, and III malocclusions as 62.28 %, 29.4%.and 8.2% respectively in the eastern Nepalese population. Shaikh<sup>13</sup> reported the frequency of various types of malocclusions as class I at 68.0%, Class II Division 1 at 28.8%, Class II Division 2 at 2.4%, and Class III at 0.8%. This study showed a comparatively higher prevalence of malocclusion compared to Kharbanda et al<sup>14</sup> who found 36.6% of malocclusion in New Delhi and Sandhu et al<sup>15</sup> where malocclusion prevalence in south India is 49.2% in the age group 12-15yrs. This study agrees with Das et al<sup>16</sup> who conducted an epidemiologic study of malocclusion in 8-12 years of age in Bangalore city in 2008 and reported a high incidence of malocclusion of 71%. Shrestha BK et al<sup>17</sup> showed the result of 90.4% malocclusion among medical students of the Institute of Medicine in Kathmandu, Nepal. Among various studies on Caucasians; Krogman found the prevalence of malocclusion in 28%, 24.4%, and 1.7% in Class I, II,

and III respectively.<sup>18</sup> A study on 651 Indian-American children and teenagers aged 6-18 years; revealed Class I in 53%; Class II in 9.5% and Class III in 2.9%. Proffit et al<sup>19</sup> studied the data from the NHANES III survey (USA) and reported that 30% had Angle's normal occlusion, 50% had Class I malocclusion, 15% had Class II malocclusion and 1% had Class III malocclusion. Lew et al<sup>20</sup> in 1050 Chinese children reported 7.1% as normal occlusion, 58.8% as Class I malocclusion, 18.8% as Class II, division 1 malocclusion, 2.7% as Class II, division 2 malocclusion and 12.6% as Class III malocclusion.

The present study showed that 41.2% of the subjects had increased overjet. Similar findings were documented by U Parajuli et al<sup>11</sup>, Shrestha BK et al<sup>9</sup>, and Ciuffolo et al<sup>18</sup>; which were 39.3%, 43%, and 41% respectively.

The present study showed that anterior crowding was more common than posterior crowding which was 70.8% and 9.7% respectively. Also, anterior crowding was more prevalent than anterior spacing which was 17.5%, which is similar to a study done in Pokhara by Parajuli U<sup>11</sup>. A study by Sharma JN<sup>12</sup> also showed that the prevalence of midline diastema was 16% in people of eastern Nepal. Similar findings were found in Maltese<sup>21</sup> and Brazilian<sup>22</sup> studies which showed anterior crowding was more prevalent than spacing. This study showed anterior crossbite in 16.3% and posterior crossbite in 26.1% of patients which was opposite to the study by Parajuli U<sup>11</sup> and JN Sharma<sup>12</sup> which showed anterior/posterior crossbite 10.3%/6.8% and 12.9%/3.7% respectively. The differences could be due to ethnic diversity and study design. In this study, statistically significant differences were observed in the distribution of overbite and anterior crowding between male and female samples. Females have a significantly higher prevalence of deep bite and anterior crowding. This study doesn't show similar results to different studies in Nepal.

The present study showed various degrees of orthodontic treatment needs among the population of the Chitwan district of Nepal. More patients fall in the grade 1 and 2 categories (no or little need for treatment) which are contrary to Shrestha BK et al<sup>17</sup> showed more patients are in Grade 4 and 5 (Definite need for treatment). This study can be compared to a study conducted by Parajuli et al.<sup>11</sup> in Pokhara, Nepal, as well as another study conducted by Burden DJ and Holmes A.<sup>23</sup> in Manchester and Sheffield, UK.

## CONCLUSION

1. Among the patients seeking treatment at the Department of Orthodontics, College of Medical Sciences, Bharatpur, Chitwan, Nepal the prevalence of malocclusion was reported to be 67.7%. within this group, Class I malocclusion was present in 55.2% of the cases, Class II malocclusion in 40.9%, and Class III malocclusion in 3.9%.

2. Anterior crowding was observed to be more prevalent compared to posterior crowding and spacing. Posterior crossbite cases were found to occur more frequently than anterior crossbite cases. Additionally, excessive overbite cases were more commonly observed than open-bite cases.

3. According to the Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN), the majority of patients in this study were categorized into grades 1 and 2, with grades 4 and 5 following next in frequency

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